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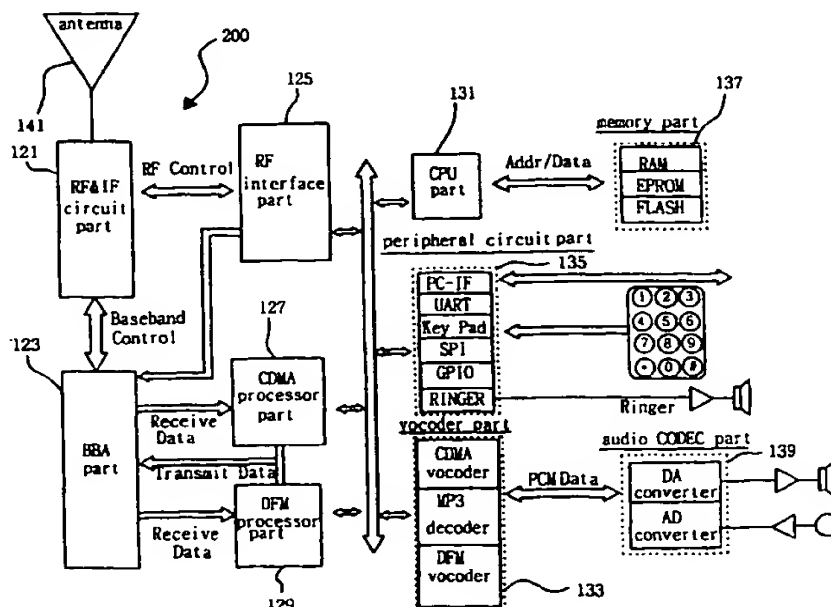
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(57) Abstract

The present invention relates to a mobile terminal unit having antenna (141), CPU (131), peripheral circuits (135), vocoder (133), memory unit (137), audio CODEC (139). The present invention further includes a flash memory in the memory unit (137) for saving the MP3 data received from the antenna (141), an interface for communicating data with PC, an MP3 decoder added to the vocoder (133) for converting the MP3 data to PCM data, and a D/A converter for converting the PCM data decoded by the MP3 decoder to audio signal, thereby enabling to save the MP3 data and play the audio signal from the MP3 data.

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MOBILE TERMINAL UNIT

DESCRIPTION

Technical Field

5 The present invention relates to a mobile terminal unit, more particularly, to a mobile terminal unit having a function of an MP3 player

Background Art

10 Fig. 1 shows a block diagram of one of mobile terminal units according to a related art.

 A mobile terminal unit 100 according to the related art is constituted with an antenna 41, an RF & IF circuit part 21, a BBA(base band analog processor) part 23, a RF interface part 25, a CDMA(code division multiple access processor) part 27, a DFM(digital FM, IS-95A) processor part 29, a CPU part 31, a vocoder part 33, a peripheral circuit part 35, a memory part 37, and a voice CODEC part 39.

 The peripheral part 35 is further constituted with a UART(universal asynchronous receiver transmit) circuit part, a key pad, SPI, GPIO, a ringer and the like.

 The memory part 37 includes RAM, EPROM, flash memory.

20 The vocoder part 33 includes a CDMA vocoder, a DFM vocoder.

 The voice CODEC part 39, in which an AD converter and a DA converter are built, carries out an AD conversion at a transmitting mode, while carries out a DA conversion at a receiving mode.

25 When voices signals are transmitted by the mobile terminal unit of the related art, analog signals generated from a microphone is converted into digital signals by the voice CODEC part 39 so as to be sent to the vocoder part 33. When the operation mode is CDMA, the CDMA vcoder in the CDMA processor part 27 and the CDMA vocoder processes the signals. But, when the operation mode is DFM for analog mode such as AMPS, TACT, etc., the DFM vocoder in the DFM processor part 29 and the

vocoder part 33 processes the signals.

An output of the vocoder part 33 is inputted to the CDMA processor part 27 or the DFM processor part 29 to be processed. And, the output of the vocoder part 33 is inputted to the BBA part 23 to be converted into a baseband signal. Then, the
5 output of the BBA part 23 is inputted to the RF & IF circuit part 21 to become a electromagnetic wave signal so as to be transmitted through the antenna 41.

When the mobile terminal unit is on receiving mode, an RF signal received by the antenna is converted into a baseband signal by the RF & IF circuit part 21. Then, the converted RF signal is inputted to the BBA part 23 to be transformed into a digital
10 signal. The digital signal having been processed by the processor parts 27 and 29 is inputted into the vocoder part 33 to be transformed into a PCM(pulse code modulation) type data so as to be inputted to the voice CODEC part 39. Then, the data having been converted into an analog signal by the voice CODEC part 39 is sent to a speaker or an earphone.

15 Such operation is controlled by the CPU part 31 so that a signal for operating the RF & IF circuit part 21 and the BBA part 23 such as offset and gain control is transferred through the RF interface part 25.

Besides, the CPU part 31 controls the whole system such that function of interfacing with the keys and ringing are controlled through the peripheral circuit part
20 35.

The mobile terminal unit according to the related art has functions enough to be used as a personal communication device, which is yet enough to satisfy personal desires. Presently or in the near future, a new terminal unit enabling to perform video and data communications as well as a voice is strongly required.

25

Disclosure of Invention

An object of the present invention is to provide a mobile terminal unit to which an MP3 player function, which enables to store and play digital audio data, is added efficiently.

To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described, the present invention includes an antenna(141), a CPU part(131), a peripheral circuit part(135), a vocoder part(133), a memory part(137), and an audio CODEC part(139). And, the mobile terminal unit further includes an MP3 flash memory added to the memory part(137) to store MP3 data, a PC interface added to the peripheral circuit part(135) to transmit/receive data with a PC, an MP3 decoder added to the vocoder part 133 to transform the MP3 data into PCM data, and a D/A converter added to the audio CODEC part(139) to transform the PCM data generated from the MP3 decoder into audio signals, wherein the mobile terminal unit stores the MP3 data and plays the audio signals as well as has a function of mobile communication.

Compared to the related art which produces a mobile terminal unit and an MP3 player respectively so as to bring about unnecessary resource consumption and inconvenience for usage, the present invention realizes a mobile terminal unit having an MP3 player function by adding simple elements thereto. Accordingly, the present invention enables to reduce a hardware cost by carrying out functions of both telephone transceiver and MP3 decoder by a vocoder part constituted with a single DSP chip.

Brief Description of Drawings

Fig. 1 shows a block diagram of one of mobile terminal units according to a related art; and

Fig. 2 shows a block diagram of a mobile terminal units according to the present invention.

Best Mode for Carrying Out the Invention

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

Fig. 2 shows a block diagram of a mobile terminal units according to the

present invention.

Referring to Fig. 2, a mobile terminal unit 200 according to the present invention includes the elements of the related art such as an antenna 141, an RF & IF circuit part 121, a BBA(base band analog processor) part 123, an RF interface part
5 125, a CDMA(code division multiple access processor) part 127, a DFM(digital FM, IS-95A) processor part 129, a CPU part 131, a vocoder part 133, a peripheral circuit part 135, a memory part 137, and a voice CODEC part 139.

To add an MP3 player function effectively to the mobile terminal part of the present invention, the elements of the related art is reformed by the following.

10 A PC-IF interface functioning as a signal connection interface to a PC(personal computer) is added to the peripheral circuit part 135. Namely, the PC-IF interface for transceiver is added to the peripheral circuit part of the related art consisting of a UART circuit part, a key pad, SPI(synchronous parallel interface), GPIO(general purpose input output), a ringer.

15 A flash memory for MP3 to store MP3 data is added to the memory part 137 including the related art memory such as RAM, EPROM, flash memory. It is desirable for the flash memory for MP3 to have at least over 8M bytes of a semiconductor device. The flash memory may be substituted by a detachable smart media card or a combination use in case.

20 The vocoder part 133 consisting of a high performance DSP(digital signal processing) chip functions for an MP3 decoder as well as the CDMA and DFM vocoders of the related art by depending on a micro-code built in the DSP.

Not used as a portable wireless phone, the mobile terminal unit of the present invention of which memory part 137, peripheral circuit part 135, and vocoder part
25 133 are improved enables to be used as an MP3 player. Operated as the MP3 player, the mobile terminal unit according to the present invention decodes MP3 data, converts the decoded MP3 data into audio analog signals by DA(digital to analog) conversion, and outputs the signals through earphone(s) or speaker(s).

The present invention may download digital audio data such as MP3, MPEG1,

MPEG2, AAC and the like which are provided by internet or transmission stations so as to play the data.

After MP3 audio data have been downloaded from a PC, digital audio data via the PC are stored in the flash memory of the memory part 137 through the PC-IF
5 interface of the peripheral circuit part 135 before decoding.

In this case, the PC-IF includes an IEEE 1284 ECP protocol using a parallel port or a USB(universal serial bus) using a serial bus. And, in order to store MP3 audio data, the memory requires at least 8 MB larger than the flash memory of the related art so that a detachable memory card such as a smart media card is introduced.

10 During downloading the data from the PC, the data flow by the manner such that PCIF(interface) of peripheral circuit part 135 _ CPU part 131 _ flash memory of memory part 137.

When MP3 encoded DATA are downloaded from a transmission station, RF signals received by the antenna 141 pass through the RF & IF circuit part 121, the
15 BBA part 123, and the CDMA processor part 127 successively so as to be MP3 signals. The MP3 signals are stored in the flash memory of the memory part 131 by the CPU part. In this case, the data flow by the manner such that RF & IF circuit part 121 _ BBA part 123 _ CDMA processor part 127 _ CPU part _ flash memory of the memory part 137.

20 The procedure of decoding the MP3 signal is explained in the following.

The encoded audio MP3 data having been stored in the flash memory of the memory part 137 are read and sent to the vocoder part 133 by the CPU part 131.

And, the vocoder 133 restores the data into PCM(pulse code modulation) data of original form in use of a micro-code for CDMA vocoding out of micro-codes for
25 MP3 decoding and CDMA vocoding.

Then, the restored PCM data are sent to the audio CODEC part 139 and outputted through the DAC(digital to analog converter) to embody analog signals having CD audio quality to be connected to an earphone. In this case, analog signals of high quality as good as CD audio are attained from audio CODEC provided that

a DA converter having at least 16 bits of which audio quality is more excellent than the conventional voice CODEC.

A DA function in the audio CODEC is required only for MP3 decoding, while an AD(analog to digital) function as well as the DA is also required for CDMA
5 vocoding or DFM vocoding.

In the above-explained cases, the CPU part 131 carries out a function as a user interface for key control, display control and the like and controls the entire system when MP3 decoding and working as a phone.

10 **Industrial Applicability**

Accordingly, a mobile terminal unit according to the present invention is constituted by adding a flash memory in the memory unit for saving the MP3 data received from the antenna, an interface for communicating data with PC, an MP3 decoder added to the vocoder for converting the MP3 data to PCM data, and a D/A
15 converter for converting the PCM data decoded by the MP3 decoder to audio signal to the mobile terminal unit according to the related art consisting of antenna, CPU, peripheral circuits, vocoder, memory unit, audio CODEC, thereby enabling to save the MP3 data and play the audio signal from the MP3 data.

CLAIMS

1 A mobile terminal unit, the mobile terminal unit including an antenna(141), a CPU part(131), a peripheral circuit part(135), a vocoder part(133), a memory part(137), and an audio CODEC part(139), the mobile terminal unit comprising:

5 an MP3 flash memory added to the memory part(137) to store MP3 data;
a PC interface added to the peripheral circuit part(135) to transmit/receive data with a PC.

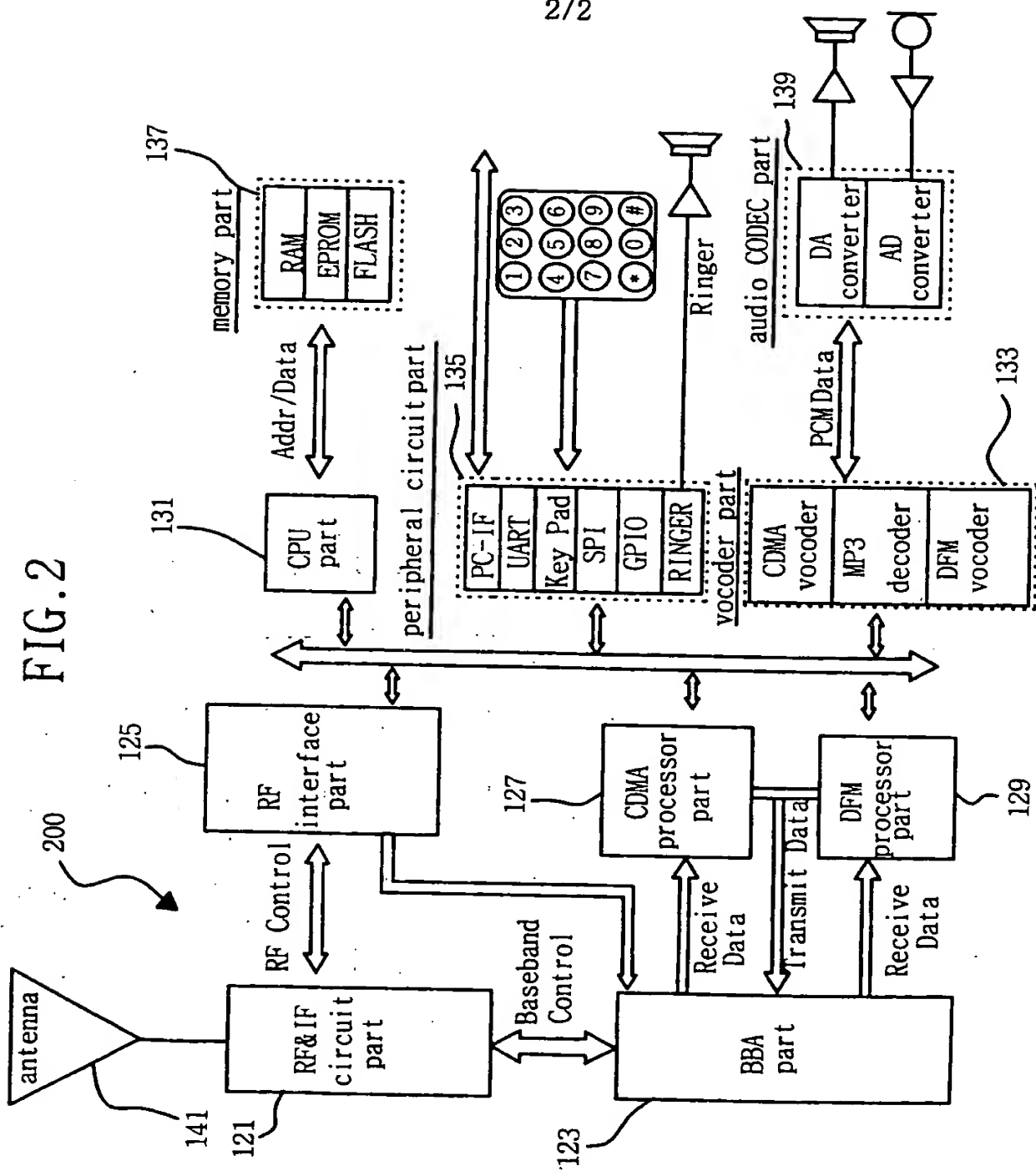
an MP3 decoder added to the vocoder part 133 to transform the MP3 data into PCM data, and

10 a D/A converter added to the audio CODEC part(139) to transform the PCM data generated from the MP3 decoder into audio signals,

wherein the mobile terminal unit stores the MP3 data and plays the audio signals as well as has a function of mobile communication.

2. The mobile terminal unit according to claim 1, wherein the D/A converter has a processing capacity of at least 16 bits.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER IPC7 H04B 1/40 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC7 H04B 1/38, 1/40, H04M 1/21, H04L 12/58 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
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Y	KR 99-24210 A (JAE-HAN, KIM) 25 MARCH 1999 see page 2, lines 15 - page 3, lines 11 see claim 1, figure 1	1-2
Y,P	KR 99-79660 A (DANAL CORP.) 5 NOVEMBER 1999 see page 3, lines 10 - lines 39 see claims 1-7	1-2
Y,P	KR 99-22020 U (SEONG-KWAN, HEO) 25 JUNE 1999 see page 2, lines 17 - lines 33 see claim 1	1-2
Y,P	KR 00-27473 A (LG ELECTRONIC CORP.) 15 MAY 2000 see abstract see claim 1	1-2
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